

Discussion of Qian, Reinhart, and Rogoff's "On Graduation from Default, Inflation and Banking Crises: Ellusive or Illusion" *

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1 Introduction

[Qian et al. \(2010\)](#) (henceforth QRR) have assembled an impressively rich data set on external default, banking, and monetary crises. This paper is part of an ambitious project on placing crises in the proper historical perspective (e.g., [Reinhart and Rogoff, 2009](#)). It is an extremely valuable research agenda, as much of modern sovereign debt literature has focused on recent (post 1980) episodes, which give only a partial and potentially misleading view. One way the post-1980 perspective is misleading is that rich countries were relatively immune from many of the crises that plagued emerging markets, with the only exception being banking crises. However, as we learn from QRR, rich countries had more than their share of crises historically, raising the question of how a country graduates into the "stability club". This is the focus of QRR.

QRR draw several themes from the long historical data series. I will list three that motivate my discussion:

1. Many False Starts: Countries take a long time to achieve relative stability, with prolonged periods of tranquility followed by a reappearance of default or inflation. Twenty or thirty years between crises is not uncommon.

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2. Rich versus Poor: Rich countries appear to be less prone to external defaults and high inflations. Any complete story of graduation must link overall economic development with stability of macro policies.
3. Sequencing: Crises from sovereign default disappear first along a country's path of development, followed by high inflation. Banking crises appear to plague developed economies as well as developing economies as an "equal opportunity menace".

The issue I address in this discussion is whether these facts fit comfortably in modern macroeconomic models. I will conclude that to a first approximation, they do. My focus will be on default. Inflation can be considered a default on the government's nominal liabilities (whether currency or non-indexed domestic currency debt) and fits within the spirit of my remarks on default. Banking crises are somewhat different, both empirically and theoretically, and I will touch on them briefly at the end.

2 A Work Horse Model of Sovereign Default

The benchmark model of sovereign default is [Eaton and Gersovitz \(1981\)](#). This model, with some modifications, has formed the backbone of the recent literature of quantitative models of sovereign default (e.g., [Aguar and Gopinath, 2006](#), [Arellano, 2008](#)). Recall that there are three key ingredients of Eaton-Gersovitz. The first is that the face value of debt is non-contingent; the second is that governments cannot commit to repay debt, so default is always an option; and third, debt is sustained by reputational equilibria in which default triggers financial autarky.

In an endowment small open economy, for example, the government's problem can be written conditional on the stock of outstanding debt due b and current endowment y as:

$$V(b, y) = \max\langle V^{ND}(b, y), V^D(y) \rangle,$$

where V^{ND} is the value function if the government does not default and V^D is the value

function after default. Specifically,

$$V^{ND}(b, y) = \max_{c, b'} u(c) + \beta \mathbb{E}_y V(b', y'),$$

subject to

$$c + b \leq y + q(b'; y)b',$$

where $q(b'; y)$ is the equilibrium price of a bond issue of size b' given endowment state y . $V^D(y)$ is simply the autarky value function:¹

$$V^D(y) = \mathbb{E}_y \sum_{s=t}^{\infty} \beta^{s-t} u(y_s).$$

The government will default if $V^D(y) > V^{ND}(b; y)$. We close the model by assuming competitive risk neutral lenders such that sovereign debt earns an expected return equal to the world risk free rate r^* :

$$q(b'; y) = \frac{\Pr \{V^{ND}(b', y') \geq V^D(y') | y\}}{1 + r^*}. \quad (1)$$

An equilibrium is then a pricing function $q(b; y)$ and value functions that solve the above Bellman equations.

How does this model square with the QRR facts? On the plus side, this model predicts that more volatile economies will default more frequently, consistent with the historical data. This follows because default is the only insurance mechanism in the model. The impact on consumption of large negative shocks is mitigated by default, while the good endowment states repay at a higher rate than r^* . I will leave aside the issue of whether countries actually default in bad states (see [Tomz and Wright, 2007](#)), but its worth noting that many of the defaults documented in QRR occur in response to extreme events like war or the Great Depression. A larger problem for the model is that growth per se does not reduce the probability of default. If $u(c)$ is homogenous, as we typically assume, the model becomes invariant to scale. That is, if we replace an endowment process y with $\tilde{y} = \lambda y$, $\lambda > 0$, the model's predictions for default do not change.

¹It is simple to alter the length of enforced autarky so punishment is no longer an absorbing state. Such an extension allows the model to match "serial defaulting," in which countries default, are excluded for a finite period, allowed to borrow again, and then default again. See [Aguiar and Gopinath \(2006\)](#) for such a model and a discussion of what types of income processes are particularly prone to serial defaulting.

To see this, suppose $u(c) = c^{1-\gamma}/(1-\gamma)$, $\gamma \neq 1$ and let $\tilde{b} = \lambda b$. Consider the following candidate equilibrium:

- A pricing function $q(\tilde{b}; \tilde{y}) = q(b; y)$, that is homogenous of degree zero;
- $\tilde{V}^{ND}(\tilde{b}, \tilde{y}) = \lambda^{1-\gamma} V^{ND}(b, y)$;
- $\tilde{V}^D(\tilde{y}) = \lambda^{1-\gamma} V^D(y)$.

With such a pricing function, the value functions inherit the homogeneity of u . If the value functions are homogenous of the same degree, then the default decision ($V^{ND} \geq V^D$) is invariant to a scaling factor. Therefore, the pricing function becomes scale invariant, making our candidate scenario an equilibrium. As $q(b; y)$ is scale invariant, the probability of default is not necessarily lower for rich economies. What matters is the volatility of income, not its level.

Therefore, the Eaton-Gersovitz framework, while very useful for understanding the link between volatility and default, is not suited for understanding “graduation” from default.

3 Debt Overhang

In the Eaton-Gersovitz model, the nature of uninsurable income risk generated default probabilities, while the average level of income on its own was not a factor. However, there are potentially many reasons why high income will be associated with better insurance. I will develop one mechanism based on [Aguiar et al. \(2009\)](#) and [Aguiar and Amador \(2009\)](#), which emphasizes the interplay between limited commitment in fiscal policy and political economy considerations.

We depart from the stark incomplete markets environment of Eaton-Gersovitz, but continue to assume limited commitment on the part of the government. Specifically, we consider the framework of [Aguiar et al. \(2009\)](#) (AAG), in which the government can trade a non-contingent bond and impose state-contingent taxes on capital income. This is sufficient to transfer resources across states of nature, completing the markets subject to limited commitment. The incomplete markets framework of Eaton-Gersovitz has the advantage of a clearly defined equilibrium event we can label “default.” However, in practice default is accompanied by negotiation, “haircuts”, etc., in which payments become de

High Debt:	Low Investment/High Capital Taxation Limited Risk Sharing Volatility
Low Debt:	High Investment/Low Capital Taxation Comprehensive Risk Sharing Low Volatility

Figure 1: Debt Overhang

facto contingent. The recent quantitative literature on sovereign debt has also deviated from Eaton-Gersovitz by introducing additional state contingency in default punishments or explicit renegotiation.² Equilibrium default in this framework can be viewed as anticipated or “excusable default,” a concept emphasized by [Grossman and Van Huyck \(1988\)](#).

Returning to the AAG framework, the small open economy operates a neoclassical production function as well as potentially exports an endowment commodity. Risk neutral capitalists discount at the world risk free interest rate r^* . The key friction in the model is that the government can expropriate installed capital and default on debt. The larger the stock of outstanding debt, the greater the incentive to expropriate. This implies that a large amount of debt is associated with low levels of equilibrium investment, as additional capital would trigger expropriation and explicit default. In equilibrium, this is implemented by the government by a high tax on capital income. If the government could commit to tax promises, the optimal distortion of capital would be zero. Even in an environment of *iid* shocks, investment will respond to current income in the presence of debt. The reason that investment is sensitive to shocks is that the government smooths income fluctuations with debt. A low income shock raises indebtedness going forward, which lowers investment in next period’s capital. Despite *iid* shocks, fiscal policy induces persistence in the equilibrium output. Persistent fluctuations are a hallmark of emerging market business cycles ([Aguiar and Gopinath, 2007](#)).

Moreover, debt inhibits risk sharing. In particular, a heavily indebted government cannot credibly promise large payments in good states, limiting the amount it can receive in bad states. The model’s implications are summarized in figure 1.

²For example, [Aguiar and Gopinath \(2006\)](#) augments the loss of reputation with a proportional loss of income; [Arellano \(2008\)](#) makes the loss of output contingent on default non-linear, increasing the state contingency; and [Yue \(forthcoming\)](#) models renegotiation, which also introduces state contingency.

Taking stock, we see that a low volatility/high income economy is associated with low levels of debt. Moreover, low levels of debt are accompanied by better equilibrium insurance, making the crude insurance of default less necessary. This intuition speaks to the facts presented by QRR in that graduation from default is associated with higher income and less volatility. Moreover, recent economies that have graduated from low income to middle income have typically done so by reducing external debt levels. [Aguiar and Amador \(2009\)](#) documents that between 1970 and 2003, the developing countries that grew the most did so while paying sovereign down debt and accumulating reserves. This reduction in debt appears to be a right of passage to middle income status, at least in the modern era.

The analysis so far does not address the question of why some countries pay down their debt while others do not. Similarly, why do some countries take a very long time to do so, when standard growth models (like the neoclassical growth model) predict fairly fast convergence. As most external debt is sovereign debt, a reasonable place to start to answer this question is with the government. In [Aguiar and Amador \(2009\)](#) we propose a political economy model embedded in the neoclassical growth model. The political friction we consider is that political parties prefer spending to occur while they hold power, reflecting disagreement among spending priorities as well as outright corruption. Combining this with political turnover, the political parties become short-term impatient relative to the citizenry, as in [Amador \(2004\)](#). The preferences of the government matter because in equilibrium the incumbent must respect tax and debt promises made by previous governments. We show that while all countries may eventually converge to the frontier, the speed at which they do so is governed by the degree of political frictions. Moreover, growth is accompanied by reductions in debt levels, for the same limited commitment intuition discussed above. To attract investment, a country must pay down its debt, but the need to accommodate a sequence of impatient political parties slows this process down.

Such a framework speaks to the QRR result that graduation may be a slow process, with many false starts, but in the long run stability and high incomes can be secured. Viewed in this way, graduation to external financial stability is slow for the same reason that overall growth is slow, namely the short-termism of political incumbents, but this short-term impatience need not prevent convergence in the long run.

4 Rich Countries

The preceding discussion focused on graduation from low income to middle income status. A key feature was debt overhang, which is empirically relevant at least for recent episodes. However, many rich countries sustain extremely high debt to income ratios without the accompanying volatility, lack of investment, or default. In related work ([Reinhart et al., 2003](#)), Reinhart and Rogoff with Savastano document that rich countries can comfortably sustain debt levels unattainable for poor countries. My view of this point is that high income countries have other means of addressing the frictions due to limited commitment. In the environments discussed above, debt (and investment) was sustained as reputational equilibria in which deviation was punished by autarky. However, there are other mechanisms to sustain debt. I will mention two.

[Sandleris \(2008\)](#) argues that governments have private information regarding policy or other fundamentals that affect the prospects of the domestic economy. A default by the government, in equilibrium, is interpreted as a signal of economic weakness, inducing private agents to adjust their beliefs. This can have adverse consequences, such as igniting a domestic banking crisis. If the domestic banking system is important relative to sovereign debt, as is the case in most developed economies, the adverse consequences of default on the financial system are sufficient to sustain high levels of debt. This analysis is similar to reputation “spillover,” emphasized by [Cole and Kehoe \(1996\)](#), in which failure to repay debt affects other relationships.

[Broner et al. \(forthcoming\)](#) argue that well developed secondary markets for sovereign debt may be the key to sustain debt in equilibrium. The important element in their framework is that debt holders are anonymous, so the government cannot shield preferred bondholders from default. Default is deterred by bonds being held in equilibrium by domestic citizens (or any preferred group).

These are just two examples of how well developed domestic financial markets support high levels of sovereign debt, without the adverse consequences highlighted above. The important element in all these models is how the government solves the issue of limited commitment. For middle income countries, this is done by holding low levels of sovereign debt; in advanced countries, a vibrant domestic financial market plays this role.

5 Inflation and Banking Crises

So far, I have focused on external debt crises. Episodes of high inflation fit naturally in the same framework. High inflation represents default on the government's nominal liabilities, whether non-indexed pensions, domestic currency debt, or currency itself. Similarly, it can be viewed as a distortionary tax, similar to capital income taxation. From this perspective, inflation arises in a limited commitment environment for the same reasons that capital is taxed or debt is not repaid.

Banking crises represent a bigger challenge, both empirically and theoretically. Empirically, they continue to plague developed economies, making it impossible to see what a country that has "graduated" from banking crises looks like. Theoretically, we understand that the provision of liquidity often involves leverage and maturity mismatch, making banks vulnerable to runs. In many environments, a strong central bank or an alternative lender of last resort can mitigate or eliminate banking crises. This reinforces the message that government institutions and credibility continue to be key. However, the recent crisis, as well as Japan's experience in the 1990s, suggest that there are limits to what a central bank can do.

Regulation is another important public institution that matters in the frequency and severity of banking crises. Regulation comes with costs in many instances, given the informational requirements involved in the proper allocation of capital and provision of liquidity. Moreover, regulators can be captured by the targets of regulation, bringing us back to the quality of public institutions, and the political economy environment more generally. In short, the QRR facts on banking crises are consistent with the theme that the frequency of crises, whether banking, inflationary, or external debt related, depend sensitively on the quality of the economy's political institutions.

6 Summing Up

The recent literature on sovereign default holds several lessons that speak to the three QRR patterns listed at the start of the discussion. Taking up the metaphor of graduation, figure 2 traces out the key stages of progression. Primary school is a low level of development accompanied by volatility, limited risk sharing, and frequent default. This is consistent qualitatively with the environment of Eaton-Gersovitz, which features limited commitment and incomplete markets. As countries pay down their debt, they can

endogenously sustain higher incomes, less volatility, and improved risk sharing. This reflects the transition from low income to middle income status, or graduation from “primary” to “secondary” school. The key to this transition is addressing commitment issues, which in practice appears to be accomplished in part by paying down external debt. The speed of this transition may be a function of the quality of the political equilibrium. The final stage observed empirically is a highly developed private financial sector and full integration (“college”). In this stage, other mechanisms become relevant in mitigating commitment issues, such as secondary markets and deep domestic financial markets. This transition requires the development of private institutions as well as continued improvement of public institutions. Given the importance of the private financial sector and the limitations of such public institutions as central banks and regulation at this stage, continued banking crises may occur. A final stage without banking crises may be attainable in theory, perhaps one in which better public institutions combined with a decoupling of liquidity provision and leverage. Unfortunately, this stage is one that lies outside the historical record.

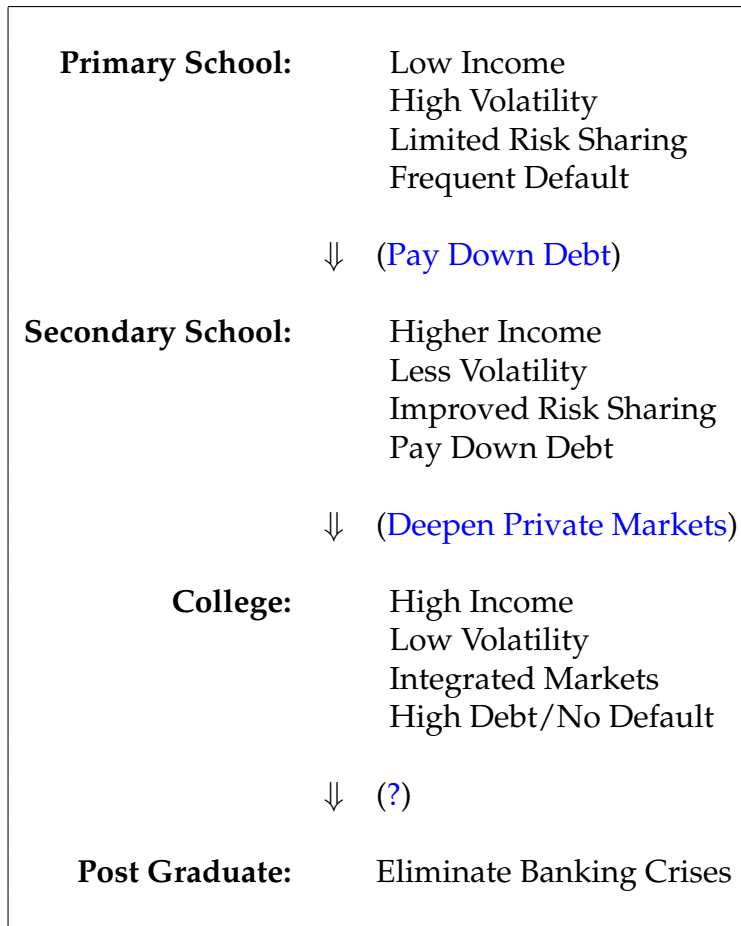


Figure 2: Graduating from Crises

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